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NASA Procedural Requirements

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(NASA Only)

Subject: NASA Research and Technology Program and Project Management Requirements

Responsible Office: Office of the Chief Engineer

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Chapter 2. NASA Life Cycles for Managing Research and Technology

2.1 Programs

2.1.1 Program Definition and Life Cycle

2.1.1.1 The following definitions are used to define Programs within this NPR:

a. **Program** - a strategic investment by a Mission Directorate (MD) or Mission Support Office (MSO) that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more Agency projects. A program defines a strategic direction that the Agency has identified as critical. It should also be noted that not all programs adhere to this NPR.

b. **Agency Program** - a program confirmed to be on the current list of programs within the "Program and Project List" at <https://polaris.nasa.gov/> and/or the Meta-Data Manager (MdM) <https://nsm.nasa.gov/nsm/home/Home.aspx>. Programs on these lists are particular, because they are issued four digit alpha numeric designators by the Office of the Chief Financial Officer (OCFO) for organizing funding within NASA and explaining NASA's funding to external groups. Also, Agency-level organizations such as the Office of the Administrator, Program Analysis and Evaluation (PA&E), the Office of the Chief Engineer (OCE), the OCFO, and the Office of Safety and Mission Assurance (OSMA) track, monitor, and assess the health and success of Agency programs. While most programs are Agency programs, there are special cases such as in Cross-Program Research or Center discretionary funding where the Agency or personnel within the Agency may refer to an investment as a program when it is not on these lists. An Agency program may consist of Space Flight Projects, TD Projects, R&T Portfolio Projects, and Institutional Projects. It should also be noted that not all Agency programs adhere to this NPR.

Agency programs are usually long-term commitments by the Agency with a common focus. Because of this, NASA rarely begins new programs and they may appear to have no beginning, end, or life cycle. In actuality, Agency programs do follow a specific life cycle, usually in an ongoing program implementation phase with periodic program reviews and the cyclical starts and stops of projects.

c. **R&T Program** - an Agency program that is strictly comprised of R&T projects. The R&T Program life cycle is defined in Figure 2.1.1. The life cycle includes the minimum set of reviews and gate products. The R&T Program management requirements are defined in Chapters 2 and 3 of this document.

d. **Cross-Program Research** - collective management of R&T Portfolio Projects taken from various Agency programs within the MD or MSO. Cross-Program Research is controlled by a Research Director (typically at NASA Headquarters (HQ)) rather than a Program Lead. The Cross-Program Research management requirements are defined in Chapter 3, Section 3.5.

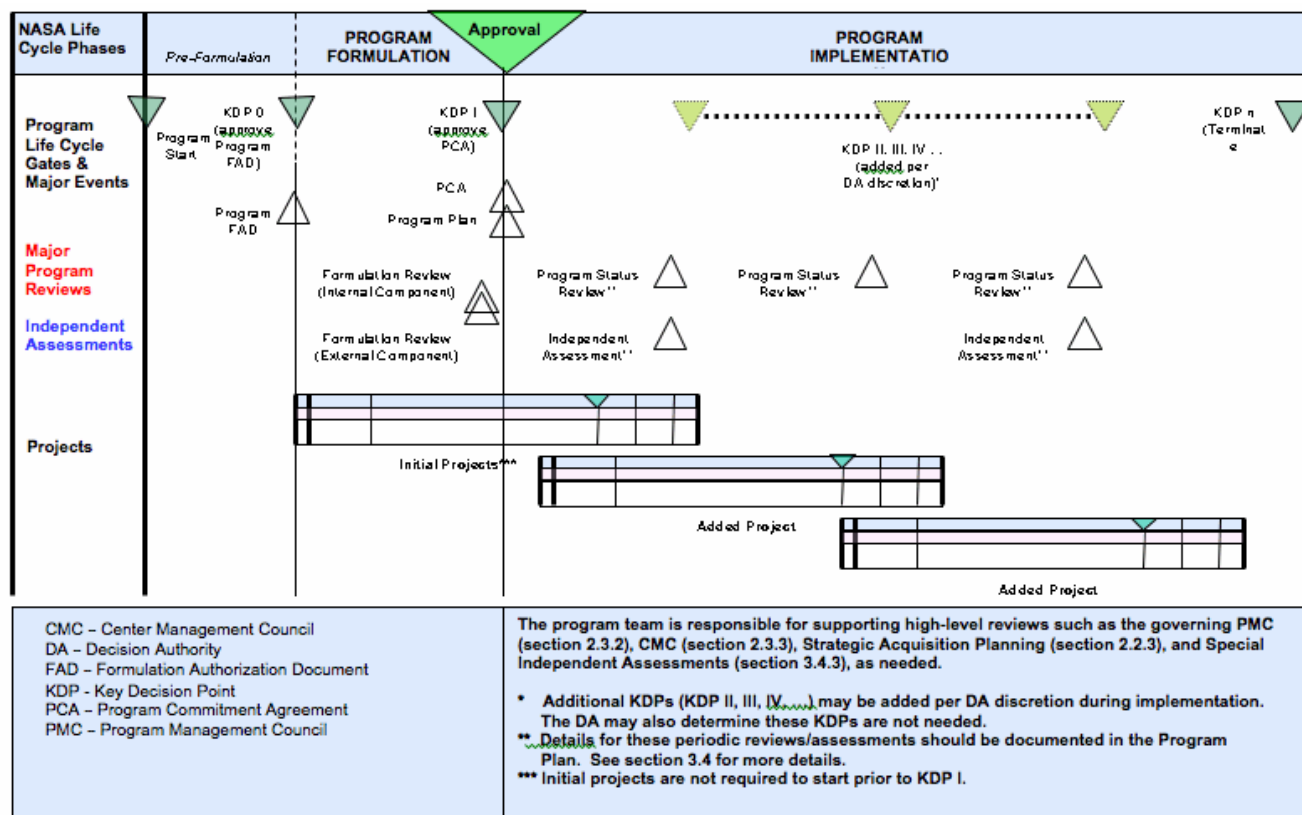


Figure 2.1.1 R&T Program Life Cycle (Chapter 3)

2.2 Research and Technology Projects

2.2.1 Project Definitions and Life Cycles

2.2.1.1 The following definitions are used to define projects within this NPR:

a. Project - specific investment identified in a Program Plan having defined requirements, a life-cycle cost, a beginning, and an end. A project yields new or revised products that directly address NASA's strategic needs. It should also be noted that not all projects adhere to this NPR.

b. Agency Project - a project confirmed to be on the current list of projects within the "Program and Project List" at <https://polaris.nasa.gov/> and/or the Meta-Data Manager (MdM) <https://nsm.nasa.gov/nsminfo/home/Home.aspx>. Projects on these lists are particular, because they are issued six digit alpha numeric designators by the Office of the Chief Financial Officer (OCFO) for organizing funding within NASA and explaining NASA's funding to external groups. Also, Agency-level organizations such as the Office of the Administrator, Program Analysis and Evaluation (PA&E), the OCE, the OCFO, and the OSMA track, monitor, and assess the health and success of Agency projects. While most projects are Agency projects, there are cases where lower-level projects (e.g., project elements) are confused with Agency projects or personnel within the Agency refer to specific Center investments as projects when they are not on these lists. It should also be noted that not all Agency projects adhere to this NPR.

c. R&T Project - an Agency project that is strictly comprised of R&T investments. Compared to other projects, R&T projects tend to define a cost/schedule structure rather than a life-cycle cost (LCC) and end date. R&T projects are managed as Technology Development (TD) Projects (as defined in Chapter 4 of this NPR) or as R&T Portfolio Projects (as defined in Chapter 5 of this NPR).

d. Technology Development (TD) Project - a specific R&T project identified in an Agency Program Plan as a TD Project. The TD Project is managed by a Project Lead who reports to a Program Lead. The TD Project life cycle is defined in Figure 2.2.1. The TD Project management requirements are defined in Chapter 4 of this document. A TD Project may be referenced elsewhere in Agency documentation as Advanced Technology Development (ATD).

e. R&T Portfolio Project - a specific R&T project identified in an Agency Program Plan as an R&T Portfolio Project. An R&T Portfolio Project may be made up of one or more groups of R&T investigations that address the goals and objectives of the R&T Portfolio Project. An R&T Portfolio Project is managed by a Project Lead who reports to a Program Lead or Research Director. The R&T Portfolio Project life cycle is defined in Figure 2.2.2. The R&T Portfolio Project management requirements are defined in Chapter 5 of this document. An R&T Portfolio Project may be referenced elsewhere in Agency documentation as Basic and Applied Research (BAR).

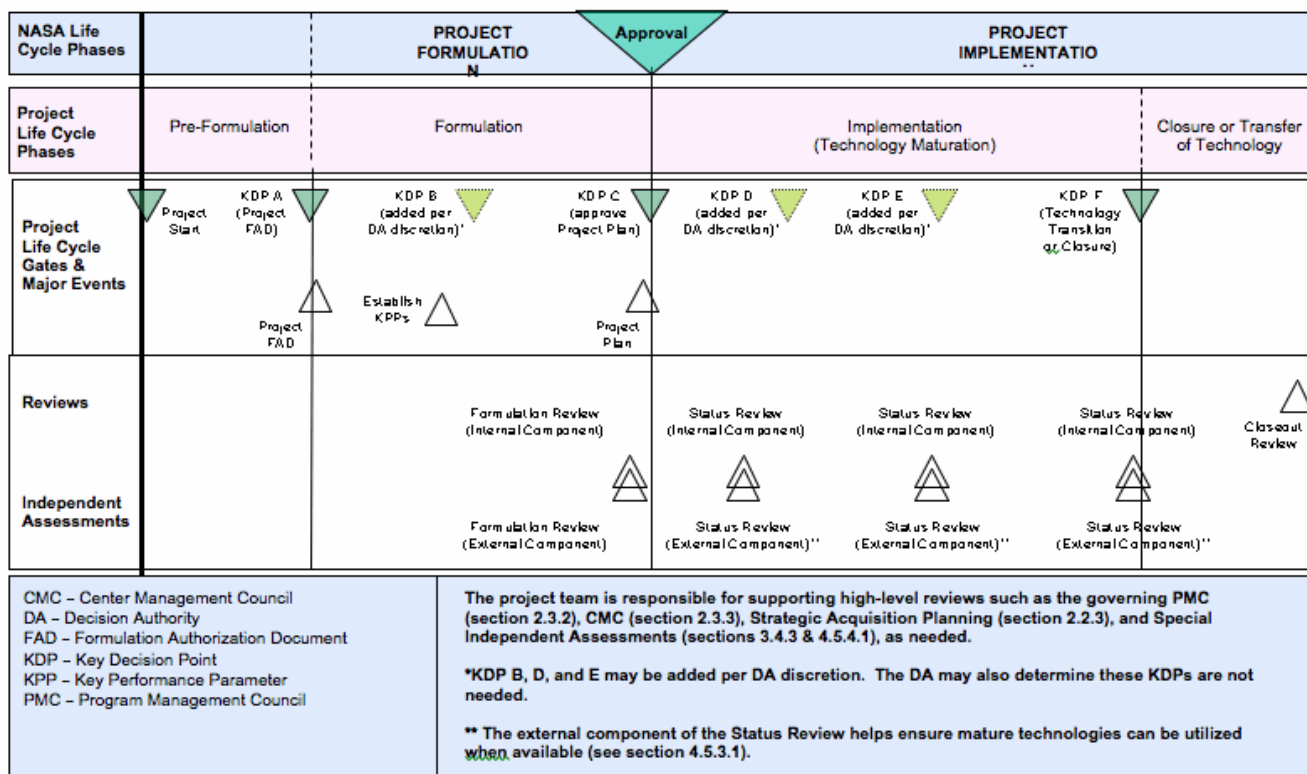


Figure 2.2.1 Technology Development Project Life Cycle (Chapter 4)

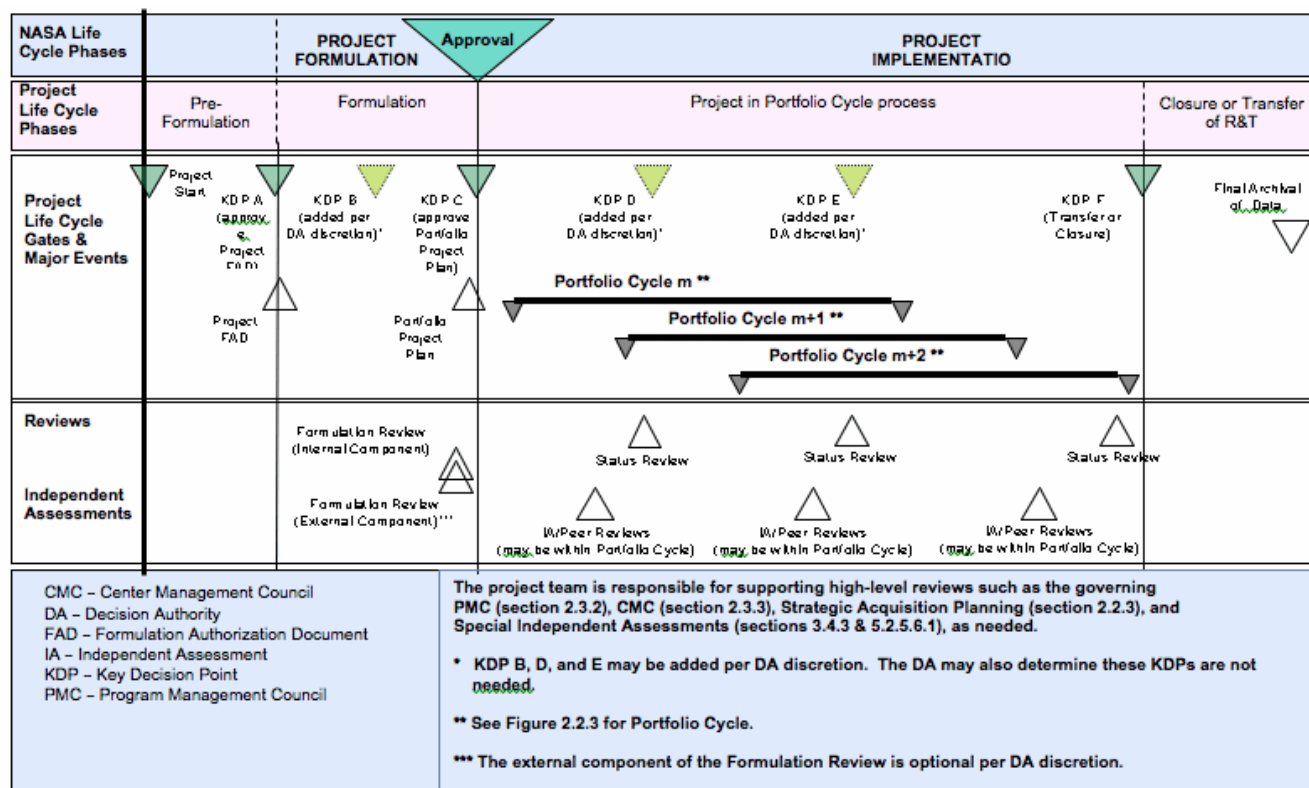


Figure 2.2.2 R&T Portfolio Project Life Cycle (Chapter 5)

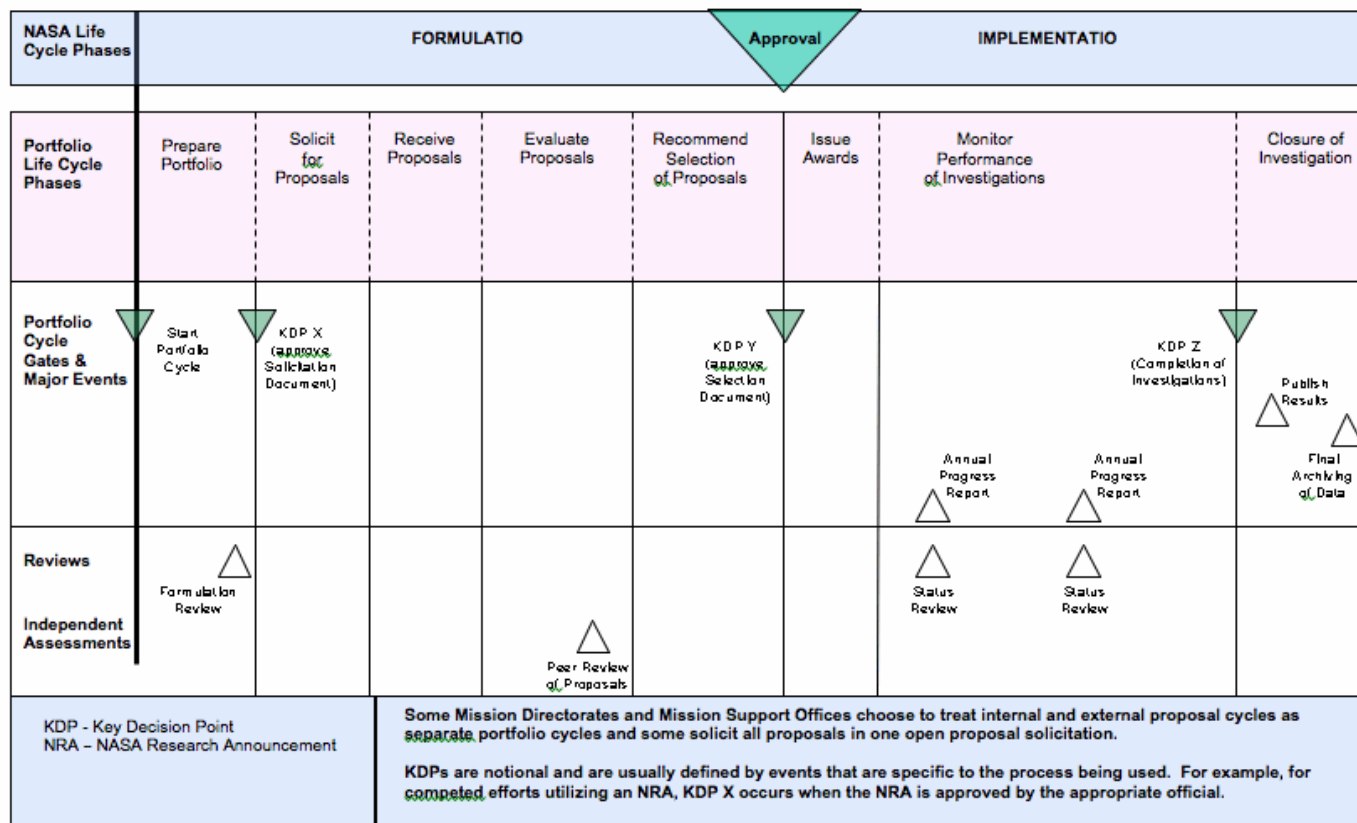


Figure 2.2.3 Portfolio Cycle (Chapter 5)

2.2.2 Meta-Data Manager (Mdm)

2.2.2.1 The OCFO with assistance from the OCE maintains the official database of NASA programs and projects known as the Mdm. This database is the basis for the Agency's WBS and forms the structure for program and project status reporting across all MDs and MSOs.

2.2.3 Strategic Acquisition Planning

2.2.3.1 NASA's strategic acquisition planning and authorization is a continuous process requiring the earliest possible informed decisions to ensure programs and projects have the proper budget authorization and Agency commitment.

2.2.3.2 Three discrete acquisition events facilitate this decision process: the Acquisition Strategy Planning (ASP) meeting, the Acquisition Strategy Meeting (ASM), and the Procurement Strategy Meeting (PSM).

2.2.3.2.1 The ASP provides the forum for senior Agency management to review major acquisitions before authorizing budget/expenditures. The ASP meeting is used during approval of programs and projects for formulation.

2.2.3.2.2 The ASM examines the Agency's acquisition approach (e.g., internal make-or-buy, Center assignments, etc.). The ASM is program- or project-specific and is more detailed than the ASP meeting. The ASM occurs during the program and project formulation and approval processes.

2.2.3.2.3 The PSM, formerly called the Acquisition Strategy Meeting, approves the procurement approach for each procurement. The PSM is project- or contract-specific and is developed by the Project Lead, supported by the Contracting Officer, and approved as prescribed in NPR 5100.4, Federal Acquisition Regulation Supplement (NASA/FAR Supplement) [48 CFR 1800-1899].

2.2.3.3 R&T Programs, TD Projects, and R&T Portfolio Projects are subject to each of these three strategic acquisition events.

2.2.3.3.1 Applicability of the ASP and the ASM is dependent on multiple factors, including associated resources and workforce parameters. To determine ASP and/or ASM applicability, and to obtain additional guidance regarding these meetings, the cognizant MD or MSO will consult with NASA Headquarters, Office of Program and Institutional Integration.

2.2.3.3.2 To determine PSM applicability, the cognizant MD or MSO, supported by the Project Lead and the Contracting Officer, will consult with NASA Headquarters, Office of Procurement, Program Operations Division.

2.2.3.3.3 When determined applicable, these three strategic acquisition events are part of the normal program and project formulation and implementation activities described in the following paragraphs and chapters.

2.3 R&T Program, Technology Development (TD) Project, and R&T Portfolio Project Oversight and Approval

2.3.1 This section describes NASA's oversight approach for R&T Programs, TD Projects, and R&T Portfolio Projects. This section also defines KDPs and the Decision Authority (DA) responsible for approval of each KDP.

2.3.2 To ensure the appropriate level of management oversight, NASA has established a hierarchy of Program Management Councils (PMCs)?the Agency PMC and MD PMCs (or MSO equivalent). Each council has the responsibility of periodically evaluating the cost, schedule, risk, and performance of Agency programs or Agency projects under its purview. The evaluation focuses on whether the Agency program or Agency project is meeting its commitments to the Agency and is following appropriate management processes. Each Agency program and Agency project has a governing PMC that provides management oversight. For R&T Programs, TD Projects, and R&T Portfolio Projects, the governing PMC and the DA for each KDP are defined in Table 2.3.1 and Table 2.3.2 (see Table 5.1.1 for more detail on R&T Portfolio Projects).

	R&T Program (Figure 2.1.1)	Comments
Approving Official for Start and KDP 0	MDAA (or MSOD)	
Program Decision Authority (DA) (KDP I, II, III, ... n)	NASA Associate Administrator (AA)	<p>While the R&T Program KDP I is the NASA AA's signature on the R&T Program Commitment Agreement (PCA), the MDAA or MSOD concurrently signs the R&T Program Plan for an R&T Program to continue into implementation.</p> <p>The NASA AA can delegate responsibility to the MDAA or MSOD (see section 3.3.3.1.5).</p> <p>Optional KDPs (KDP II, III, IV, ...) may be added per DA discretion during implementation. The DA may also determine these optional KDPs are not needed.</p>
Selecting Official for Formulation Review Team	NASA AA	<p>The NASA AA can delegate responsibility to the MDAA or MSOD for selection of the Formulation Review team.</p> <p>This refers to the Formulation Review in section 3.3.3.3.</p>
Selecting Official for Independent Assessment Team(s)	MDAA or MSOD	<p>This refers to the independent assessments specific to section 3.4.1. The MDAA or MSOD can delegate responsibility for selection of independent assessment team(s). The Associate Administrator for PA&E will ensure that the team(s) and process is independent and objective. The MDAA or MSOD must obtain approval from the AA for PA&E and the Chief Engineer per section 3.4.1.</p> <p>Other independent assessments may occur per section 3.4.</p>
Governing PMC	Agency PMC	The Agency PMC can delegate oversight responsibility to the MD PMC or MSO equivalent.
Governing Document	R&T Program Plan	The R&T Program Plan is approved by the MDAA or MSOD.

The R&T Program and Project Plans must reflect modifications due to the comments above and document the attendant rationale for the change.

Table 2.3.1 Summary of Authorities for R&T Programs

	Technology Development Project (Figure 2.2.1)	R&T Portfolio Project (Figure 2.2.2)	Comments
Approving Official for Start	MDAA (or MSOD)	MDAA (or MSOD)	The MDAA or MSOD can delegate responsibility to the Program Lead or Research Director.
Project Decision Authority (DA) (KDP A-F)	MDAA (or MSOD)	MDAA (or MSOD)	The MDAA or MSOD can delegate responsibility to the Program Lead or Research Director.
Selecting Official for Independent Assessment and Formulation Review Team(s)	MDAA (or MSOD)	MDAA (or MSOD)	<p>The MDAA or MSOD can delegate responsibility to the Program Lead or Research Director.</p> <p>This refers to the Formulation Review in section 4.3.4.3 and 5.2.3.5.</p> <p>This refers to the independent assessments in section 4.5.2.4 and 5.2.5.6.1.</p> <p>The MDAA or MSOD must obtain approval from the Chief Engineer and the AA for PA&E per section 4.3.4.3.2 and 4.5.2.4.</p>
Governing PMC	MD PMCor MSO equivalent	MD PMC or MSO equivalent	
Governing Document	TD Project Plan	R&T Portfolio Project Plan	The TD and R&T Portfolio Project Plans are approved by the Project DA with concurrence by the Program Lead/Research Director and applicable Center Director(s) (CD).

The R&T Program and Project Plans must reflect modifications due to the comments above and document the attendant rationale for the change.

Table 2.3.2 Summary of Authorities for R&T Projects

2.3.3 Oversight of Agency programs and Agency projects is also performed by a Center Management Council (CMC), which may evaluate all R&T work executed at that Center. The CMC evaluation is an independent assessment that focuses on whether Center engineering and management practices (e.g., resources, contracting, institutional, and technical authority) are being followed by the R&T work under review, and whether Center resources can support R&T work requirements. The evaluation should also focus on the technical authority role of the Center to ensure technical and scientific integrity of work conducted at that Center. A CMC provides its findings and recommendations to the governing PMC.

2.3.4 A KDP occurs when the DA determines the readiness of a program or project to progress to the next phase of its life cycle. As such, KDPs serve as gates through which programs and projects must pass. To support the decision process, a KDP is typically preceded by one or more reviews. KDPs enable a disciplined approach to assessing programs and projects. The potential outcomes at a KDP include:

- a. Approval to enter the next phase of the life cycle.
- b. Approval to enter the next phase of the life cycle, pending resolution of actions.

c. Disapproval to enter the next phase of the life cycle, with a decision to terminate.

d. Disapproval to enter the next phase of the life cycle, with follow-up actions required. In such cases, follow-up actions are documented and the KDP is redone after the follow-up actions are completed.

2.3.5 To support the decision process, the DA will designate the required supporting materials (gate products) that will be submitted in support of the KDP. These materials may include: the governing PMC review recommendation; the Independent Assessment (IA) report; the Program Lead's recommendation; the Project Lead's recommendation; Cost Estimation reports; the CMC's recommendation; relevant lessons learned; any documents requiring the DA signature (e.g., R&T Program FAD, R&T Program Plan, and R&T PCA); and any other documentation the DA deems appropriate.

2.3.6 The DA's decision is based on consideration of a number of factors, including but not limited to:

a. Continued relevance to the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

b. Technical quality of effort.

c. Continued cost affordability with respect to the Agency's resources.

d. Remaining risks (cost, schedule, technical, management, programmatic, safety).

e. Infrastructure resource readiness.

f. The viability and the readiness to proceed to the next phase.

2.3.7 At each KDP, the DA reviews the program or project to ensure that it is currently in line with the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan. At each KDP, the DA ensures that the criteria defined in the Preface P.2 are currently applicable to continue use of this NPR in lieu of NPR 7120.5, NASA Space Flight Program and Project Management Requirements.

2.3.8 To complete formal actions at a KDP, the DA makes and documents the decision and its basis (including materials presented, major issues, options, and open action items) and archives the documents, as appropriate. Following the decision, the DA signs the applicable documents, if no changes are required. If changes are required, the documents are revised, all parties-to-signatures obtained, and resubmitted to the DA for final signature. Dissenting opinions are resolved in accordance with the process described in section 3.6.

2.4 Program and Project Reviews

2.4.1 The program and project reviews identified in the life cycles are essential elements of conducting, managing, evaluating, and approving R&T programs/projects. R&T programs and projects must conduct the appropriate independent reviews or assessments that assure the relevance, quality, and performance of the program or project per the requirements in the White House guidance: <http://www.whitehouse.gov/omb/part/>. See the Quality Assessment Process and Performance Measurement Metrics in NPR 1080.1, NASA Science Management for additional guidance on assessments. In preparation for these reviews, programs and projects may conduct internal reviews to establish and manage the program/project baseline. Programs and projects are required to document in their Program and Project Plans their approach to conducting both program/project independent external and internal reviews.

2.4.2 At a minimum, Independent Assessments (IA) occur during the life cycle as shown in Figure 2.1.1, 2.2.1, 2.2.2, and 2.2.3. Programs and projects are required to document in their Program and Project Plans their approach to supporting the IAs. The Terms of Reference (ToR) for each program and project IA is a document specifying the nature, scope, schedule, and ground rules for these types of independent reviews or independent assessments.

2.4.3 When practical, other Agency and Center reviews should be coordinated with planned program and project reviews.

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